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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,861	01/31/2005	Willmut Zschunke	ZSHUNKE ET AL 2 PCT	4874

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EXAMINER	
TAYONG, HELENE E	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/522,861	ZSCHUNKE ET AL.	
	Examiner	Art Unit	
	Helene Tayong	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23,24,31 and 32* is/are rejected.

7)☒ Claim(s) *25-30 and 33-37* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 January 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/20/06 and 1/17/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 23 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Debabrata Saha ("Quadrature-Quadrature phase-shift keying", IEEE transactions on communications, Vol. 37, No. 5, May 1989, pages 437-448, See IDS) in view of Feher (US 20020181547).

(1) with regards to claim 23;

Saha in figures 1, 3, 8 and 13 discloses a method for dividing the bit rate (a(t)) of QPSK signals into at least two channels ($a_1(t)$)and ($a_2(t)$) having band width limited filters (matched filters) in the modulator (fig. 1) and the demodulator (fig. 10), by means of splitting the bit stream of the QPSK signals, comprising the following characteristics:

Transmitting the two bit streams by means of at least two filter branches ($P_1P_1^*$; $P_2P_2^*$), into at least one purely real spectrum (P_1) and at least one purely imaginary spectrum (P_2), by means of filters (P_1^* and P_2^*) that form pulse former pairs (fig. 13, page 446 lines 7-22), whereby

the divided bit stream is transmitted at half the bit rate f_g (page 446, subsection A lines 33-37) and, for an expansion to multi-carrier systems ((page 446, subsection A lines 38-47), the alternating real and imaginary spectra are implemented by a matched filterl (P_1) and subsequent modulation with equidistant cosine and sine carriers (section V, subsection A, page 446, lines 26-30), and

Saha discloses all of the subject matter disclosed above, but for specifically teaching a low-pass filter (P_1) for alternating the real and imaginary spectra.

However, Feter in the same field of endeavor teaches low-pass filters in fig. 18 (1905 I and 1905Q, page 8, [0084]) for alternating the real and imaginary spectra.

It would have been obvious to one of ordinary skilled in the art at the time of the invention to have substituted the matched filters of Saha with the low-pass filter of Feher in order to reduce envelope fluctuation and peak radiation, and increase efficiency. The

motivation for the substitution of the devices would be to improve performance and hence provide a lower power operation.

RSB filtering takes place (fig. 14, c), in which a purely imaginary transmission function (P_2) is determined from the difference of a low-pass having the band width f_g and of the low-pass P_1 having the band width $f_g/2$ (page 447, subsection B, lines 11-28), whereby

the zero places of the pulse responses in the two filter branches ($P_1^* \times P_1^*$ and $P_2^* \times P_2^*$) lie at a multiple of $1/f_g$ and the transmitted bit rate lies at f_g in each instance, and the spectra are band-limited (fig. 14, page 447 subsection B, lines 1-27);

Modulating the divided QPSK signals with a sine carrier or a cosine carrier, in each instance (fig. 1, section II page 438, lines 22-33 and fig. 2);

Transmitting the signal obtained in this manner to the receiver with demodulator, and demodulation of the signal (fig. 10, page 444 subsection B and fig. 2) ;

Dividing the received signal by means of at least two filter branches with a purely real transmission function (P_1^*) and a purely imaginary transmission function (P_2^*) by means of at least two filter branches having filters ($P_1^* \times P_2^*$) that form pulse former pairs, into at least two purely real spectra ($P_1^* \times P_1^*$ and $P_2^* \times P_2^*$), whereby the divided signal is transmitted at half the bit rate f_g (fig. 2, page 446, subsection A);

Demodulating the signals having the higher frequency by means of RSB (fig. 14 c) demodulation and evaluation as a basic band signal (fig. 13 and fig. 14 c subsection B).

(2) with regards to claim 31;

Saha further discloses wherein in the case of multi-carrier systems, the real and imaginary channels alternate and that this is done by means of RSB-modulation with cosine and sine carriers (fig. 14 b and pg. 446, subsection B).

4. Claims 24 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Debabrata Saha ("Quadrature-Quadrature phase-shift keying", IEEE transactions on communications, Vol. 37, No. 5, May 1989, pages 437-448) and Feher (US 20020181547) as applied to claim 1 above, and further in view of Waldeck B H et al (" Performance evaluation of TFO-Q2PSK in Gaussian, multipath and fading channels", 1999 IEEE African 5th, African Conference in Africa, cape Town, South Africa, 28 Sept. 1999-Oct. 1999, pages 233-238, See IDS).

(1) with regards to claim 24;

Saha as modified by Feher discloses all of the subject matter disclosed above, but for specifically teaching wherein the roots of the Nyquist flanks lie symmetrical to $\omega_g / 2$ for the upper flank of P_1 and the lower flank of P_2, and lie at ω_g for the upper flank of P_2.

However, Waldeck B H et al teaches double bandwidth square root Nyquist Hibert transform-pair pulses. Inherently wherein the roots of the Nyquist flanks lie symmetrical to $\omega_g / 2$ for the upper flank of P_1 and the lower flank of P_2, and lie at ω_g for the upper flank of P_2.is disclosed (pg. 233-234 section 2.2 and fig. 2).

One of ordinary skilled at the time of the invention would have been able to used the method as taught by Waldeck B H et al in method of Sada as modified by Feher in

order to maintain orthogonality between the time period.

(2) with regards to claim 32;

Saha as modified by Feher discloses all of the subject matter disclosed above, but for specifically teaching wherein the Nyquist flanks are made smaller at the carrier frequencies, in order to reduce the in-channel square cross-talk.

However, Waldeck B H et al teaches time-smoothed (1-D) partial response pulse shape pair. Inherently wherein the Nyquist flanks are made smaller at the carrier frequencies, in order to reduce the in-channel square cross-talk is taught (page 234 section 2.3).

One of ordinary skilled at the time of the invention would have been able to used the method as taught by Waldeck B H et al in method of Sada as modified by Feher in order to investigate the performance of spectrally efficient channel modulation scheme.

Allowable Subject Matter

5. Claims 25, 26-30 and 33-37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art Debabrata Saha ("Quadrature-Quadrature phase-shift keying", IEEE transactions on communications, Vol. 37, No. 5, May 1989, pages 437-448) and

Feher (US 20020181547) do not teach wherein the following functions

$$\sqrt{|H_s(\omega)|} = \sqrt{\sin \pi \frac{|\omega|}{\omega_g}}$$

are inserted on the transmitter side and/or the reception side, and additionally, a Hilbert filter is inserted in the P_2 branch, thereby achieving a duobinary or partial response coding.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Beidas et al (6278732) discloses an efficient MLSE equalization for quadrature multi-pulse (QMP) signaling.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helene Tayong whose telephone number is 571-270-1675. The examiner can normally be reached on Monday-Friday 8:00 am to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Liu Shuwang can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Helene Tayong

10/9/07

SHUWANG LIU
SUPERVISORY PATENT EXAMINER